## Amendment to the Claims

A list of pending claims follows:

1. (currently amended) An alloy ~~comprising~~consisting of at least one rare earth, including yttrium, made of iron, B, Co, Cu, Ga, and Al, as well as of production-based contaminations, whereby the following relations apply to the effective rare earth content $[SE]_{eff}$, the effective boron content $[B]_{eff}$, the mutual content of Dy, Tb, and Ho [Dy + Tb + Ho], the cobalt content [Co], the copper content [Cu], the gallium content [Ga], and the aluminum content [Al]:

$$26.9 \text{ wt.-\%} \leq [SE]_{eff} \leq 33 \text{ wt.-\%}$$
$$2.185 - 0.0442\ [SE]_{eff} \leq [B]_{eff} \leq 1.363 - 0.0136\ [SE]_{eff}$$
$$[Dy + Tb + Ho] \leq 17 \text{ wt.-\%}$$
$$0.5 \text{ wt.-\%} \leq [Co] \leq 5 \text{ wt.-\%}$$
$$0.05 \text{ wt.-\%} \leq [Cu] \leq 0.3 \text{ wt.-\%}$$
$$0.05 \text{ wt.-\%} \leq [Ga] \leq 0.35 \text{ wt.-\%}$$
$$0.02 \text{ wt.-\%} \leq [Al] \leq 0.3 \text{ wt.-\%}.$$

2. (previously presented) The alloy according to claim 1, wherein the following relation applies to the effective boron content $[B]_{eff}$:

$$1.814 - 0.0303\ [SE]_{eff} \leq [B]_{eff} \leq 1.363 - 0.0136\ [SE]_{eff}.$$

3. (previously presented) The alloy according to claim 1, wherein the rare earth content $[SE]_{eff}$ is above about 28.9 wt.-%, whereby the following relation applies to the effective boron content:

$$1.814 - 0.0303\ [SE]_{eff} \leq [B]_{eff} \leq 1.396 - 0.01491\ [SE]_{eff}.$$

4. (previously presented) The alloy according to claim 1, wherein the rare earth content $[SE]_{eff}$ is above about 28.5 wt.-%, whereby the following relation applies to the effective boron content:

$$1.814 - 0.0303\ [SE]_{eff} \leq [B]_{eff} \leq 1.478 - 0.01801\ [SE]_{eff}.$$

5. (previously presented) The alloy according to claim 1, wherein the rare earth content $[SE]_{eff}$ is above about 28.7 wt.-%.

6. (previously presented) The alloy according to claim 1, wherein the alloy has a Co-content of between about 2.5 and about 3.5 wt.-%.

7. (previously presented) The alloy according to claim 1, wherein the Cu-content is between about 0.1 and about 0.2 wt.-%.

8. (previously presented) The alloy according to claim 1, wherein the Ga-content is between about 0.20 and about 0.30 wt.-%.

9. (currently amended) The alloy according to claim 1, wherein the rare earths other than yttrium are selected from a group consisting of the elements Nd, Pr, Dy, and Tb.

10. (currently amended) A method for producing permanent magnets from an alloy according to claim 1, comprising:

- orientingorientation in theа magnetic field and pressing of powder ~~that was produced by reduction of at least one melting body,~~ into a blank;
- sintering of the blank at temperatures between about 1020°C and about 1140°C; and
- cooling of the sintered blank to temperatures below about 300°C, whereby cooling occurs at above about 800°C at a median cooling speed $\Delta T_1/\Delta t_1$ of < 5 K/min; and
- ~~starting and cooling of the blank,~~ whereby the following relation applies to the ~~starting~~annealing temperature $T_A$ of the sintered blank in dependency of a median cooling speed $\Delta T_2/\Delta t_2$:

for $\Delta T_2/\Delta t_2 < 5$ K/min:

$$450°C \leq T_A \leq 550°C \text{ for } [B]_{eff} < 2.993 - 0.069\ [SE]_{eff}$$

$$460°C \leq T_A \leq 510°C \text{ for } [B]_{eff} > 2.993 - 0.069\ [SE]_{eff}$$

for 5 K/min $\leq \Delta T_2/\Delta t_2 \leq$ 100 K/min:

$$450°C \leq T_A \leq 550°C.$$

11. (previously presented) The method according to claim 10, wherein after the sintering process, the blank is maintained at a holding temperature between about 700 and about 800°C for a period of between about half an hour and 2 hours.

12. (currently amended) The method according to claim 11, wherein the ~~raw body~~blank is cooled at a median cooling speed $\Delta T_3/\Delta t_3$ of > 5 K/min after the sintering process and following maintenance of the sintered blank at a holding temperature.

13. (previously presented) The method according to claim 12, wherein the cooling speeds $\Delta T_2/\Delta t_2$ and $\Delta T_3/\Delta t_3$ are between about 30 and about 50 K/min.

14. (currently amended) The method according to claim 10, wherein the ~~raw body~~blank is cooled at a median cooling speed $\Delta T_3/\Delta t_3$ of < 5 K/min after the sintering process and following maintenance of the sintered blank at a holding temperature.

15. (previously presented) The method according to claim 14, wherein the cooling speeds $\Delta T_1/\Delta t_1$ to $\Delta T_3/\Delta t_3$ are between about 1 and about 2 K/min.

## Response

### A. Introduction

Claims 1-15 remain pending in the application. The Examiner initially rejected claims 1-9 under both 35 U.S.C. § 112, ¶ 1 and 35 U.S.C. § 103(a), contending, respectively, that (1) no support exists in the application for Applicants' use of the term "comprising" in these claims and (2) the claims are obvious in view of either U.S. Patent No. 5,589,009 to Kim, et al. or European Patent Document No. 0753867 (the "European Document"). The Examiner initially rejected claims 10-14 under 35 U.S.C. § 112, ¶ 2, asserting that various terms and phrases used in these claims are unclear. He also objected to the specification for various reasons, requesting that Applicants submit a substitute specification, and objected to FIGS. 1 and 6-10 as containing German-language material. Although the Office Action Summary identifies claim 15 as having been rejected, no rejection of the claim is presented in the Office Action.

### B. Objections to the Specification and Drawings

The Examiner objected to the specification and drawings of the application, requesting correction thereof and submission of a substitute specification. In response thereto, Applicants have:

(1) Included behind Tab A a substitute specification with double-spaced text (as well as headings typically contained in U.S. patent applications);

(2) Added to the substitute specification the proportions, formulae, and process actions recited in claims 1-2, 4, and 10-15;

(3) Deleted from the substitute specification reference to claims 1 and 6;

(4) Revised the headings of Tables 1-4 to contain solely English-language words and abbreviations; and

(5) Revised FIGS. 1 and 6-10 (included behind Tab C) to contain solely English-language abbreviations in the legends.

Applicants believe these changes resolve all of the Examiner's objections respecting the specification and drawings of the application and accordingly request that the objections be withdrawn.

**C. Section 112 Rejections**

The Examiner variously rejected claims 1-14 under Section 112. Although Applicants believe the application supports use of the term "comprising" in claim 1, for convenience they have revised the claim to return to the original phrase "consisting of," while maintaining original language contemplating possible inclusion of production-based contaminants in the alloys. Applicants believe this reversion to the original language moots the Examiner's rejection under Section 112, ¶ 1 and thus request that the rejection be withdrawn.

Respecting claims 10-14, Applicants have:

(1) Revised claim 10 to refer to "a" (rather than "the") magnetic field;

(2) Deleted from claim 10 reference to "powder that was produced by reduction of at least one melting body";

(3) Clarified in claim 10 aspects of processing the sintered blank;

(4) Substituted "blank" for "raw body" in claims 12 and 14; and

(5) Clarified in claims 12 and 14 maintenance of the sintered blank at a holding temperature.

Applicants believe these revisions and clarifications resolve the Examiner's concerns under Section 112, ¶ 2 and request that the corresponding rejections also be withdrawn and claims 10-15, which were not otherwise rejected, be allowed.

**D. Section 103(a) Rejections**

Although acknowledging differences between Applicants' claims 1-9 and both the Kim patent and the European Document, the Examiner nevertheless initially rejected these claims as obvious in view of either reference. According to the Examiner, such obviousness exists because each reference purportedly "teaches a permanent magnet having a composition that overlaps the alloy composition recited in the instant claims." See Office Action at p. 6. Applicants, however, disagree, as they believe the Examiner has interpreted Applicants' claim 1 impermissibly simplistically. ***Accordingly, other than to resolve the Section 112 issue addressed above and add an inadvertently-omitted period, Applicants have not amended independent claim 1 in any way.***

Rather than merely reciting a range of effective boron quantities covered by claim 1, Applicants have also ***tied the boron range to the effective amount of rare earth material*** contained in the alloy. Contrary to the Examiner's chart on page 6 of the Office Action, therefore, ***no single absolute maximum and minimum values exist for the boron quantity***. Instead, each maximum and minimum value is relative to, and dependent on, the amount of rare earth material and hence must be calculated ***solely*** for that amount.

Stated differently, it is incorrect for the Examiner to contend that Applicants' claim 1 recites the complete range of 0.726-0.997 wt% boron for ***any***

amount of rare earth material present in the alloy. Rather, for any given amount of rare earth material, a ***particular*** boron range must be calculated using the formula appearing in claim 1:

$$2.185 - 0.0442\,[SE]_{eff} \leq [B]_{eff} \leq 1.363 - 0.0136\,[SE]_{eff}.$$

Applying this formula to disclosures of the Kim patent and the European Document makes clear that ***no overlapping boron ranges exist.*** Table 3 of the Kim patent, for example, discloses amounts of rare earth materials in the stated alloys A, B, and C as being 32wt%, 33wt%, and 34wt%, respectively. See Kim, col. 5, ll. 1-10. Utilizing these values in the formula of claim 1 results in calculation of boron ranges of ***0.77-0.927wt%*** (for rare earth content of 32wt%), ***0.72-0.914wt%*** (for rare earth content of 33wt%), and ***0.68-0.9wt%*** (for rare earth content of 34wt%).

By contrast, the Kim patent discloses only ***greater*** boron contents of ***1.0wt%***, ***1.1wt%***, and ***1.1wt%*** for these respective rare earth values. See id. ***No overlap thus exists*** between this disclosure of the Kim patent and the boron range of claim 1 ***as calculated pursuant to the formula contained in the claim.*** This reasoning applies equally to the rare earth quantities disclosed in Tables 8 and 11 of the Kim patent, causing Applicants to request that the Examiner's rejection based on the Kim patent be withdrawn.

Analogous reasoning governs the disclosure of the European Document. Page 4, lines 51-54 of the European Document, for example, detail alloy compositions including 29.5wt% rare earth material. Whereas the boron content calculated according to claim 1 would be between ***0.8811 and 0.96wt%***, that disclosed in the European Document is ***1.1wt%***. Similarly, while the examples

provided in the European Document demand boron content of ***at least 1wt%***, use of the formula recited in claim 1 requires boron content of ***considerably less than 1wt%*** when the values for rare earth materials provided in the examples are used. Cf. id., p. 9, ll. 5-50.

Nor do the cases cited by the Examiner undermine this reasoning in any way. In In re Peterson, 65 U.S.P.Q.2d 1379, 1392 (Fed. Cir. 2003), for example, the court addressed obviousness of a set of ***independent*** ranges, each of which was ***wholly encompassed*** by corresponding ranges disclosed in the cited prior art. Clear ***overlap in an independent range*** likewise existed between cited prior art and the rejected claims in each of In re Geisler, 43 U.S. P.Q.2d 1362, 1364 (Fed. Cir. 1997) (discussing "end point overlap"), In re Woodruff, 16 U.S.P.Q.2d 1934, 1936 (declaring phrase "***about*** 1-5%" to "allow for concentrations slightly above 5%" so as to overlap ">5-25%"), and In re Malagari, 182 U.S.P.Q. 549, 550, 553 (C.C.P.A. 1974) (also addressing end point overlap).

Finally, in Titanium Metals Corp. v. Banner, 227 U.S.P.Q. 773, 779 (Fed. Cir. 1985), the application under consideration there contained no discussion of any significance between the disclosures of the prior art and the material recited in the claim at issue. By contrast, the pending application expressly states the value of maintaining boron levels below those previously considered:

> . . . higher amounts of coercivity $H_{CJ}$ may be achieved at a lower effective boron content . . . at a larger temperature window. Therefore, the coercivity $H_{CJ}$ increases by almost 3kOe at decreasing boron content. . . .
>
> The high amounts of coercivity $H_{CJ}$, which result despite of slow cooking at a low effective content of boron of 0.92 wt-%, are of particular interest. This is beneficial especially when the Nd-Fe-B permanent magnets

> containing large sectional surfaces are to be produced . . . . According to figure 5 it is quite possible to slowly cool down Nd-Fe-B permanent magnets at cooling speeds within a range of 1 to 2 K/min after the heat treatment, without sustaining substantial imperfections of the magnetic characteristics, as long as the Nd-Fe-B alloy is low in boron. . . .

See Application at p. 10, l. 11 through p. 11, l. 4; see also FIGS. 7-8. Applicants hence believe claims 1-9 are patentable over the references of record for at least this reason and request that the claims be allowed.*

**Petition for Extension of Time**

Pursuant to 37 C.F.R. § 1.136(a), Applicants petition the Commissioner for all extensions of time needed to respond to the Office Action.

*Although Applicants believe no need exists for them to rewrite claim 1, they would be willing to consider redrafting the claim as follows if doing so would result in the Examiner's approval:

> 1. An alloy consisting of at least one rare earth, including yttrium, made of iron, B, Co, Cu, Ga, and Al, as well as of production-based contaminations, whereby the following relations apply to the effective rare earth content $[SE]_{eff}$, the mutual content of Dy, Tb, and Ho [Dy + Tb + Ho], the cobalt content [Co], the copper content [Cu], the gallium content [Ga], and the aluminum content [Al]:
>
> $$26.9 \text{ wt.-\%} \leq [SE]_{eff} \leq 33 \text{ wt.-\%}$$
> $$[Dy + Tb + Ho] \leq 17 \text{ wt.-\%}$$
> $$0.5 \text{ wt.-\%} \leq [Co] \leq 5 \text{ wt.-\%}$$
> $$0.05 \text{ wt.-\%} \leq [Cu] \leq 0.3 \text{ wt.-\%}$$
> $$0.05 \text{ wt.-\%} \leq [Ga] \leq 0.35 \text{ wt.-\%}$$
> $$0.02 \text{ wt.-\%} \leq [Al] \leq 0.3 \text{ wt.-\%}$$
>
> ***and wherein, for a specified effective rare earth content $[SE]_{eff}$, the effective boron content $[B]_{eff}$ is calculated using the following formula:***
>
> $$2.185 - 0.0442\,[SE]_{eff} \leq [B]_{eff} \leq 1.363 - 0.0136\,[SE]_{eff}$$

## Fees

Enclosed is a check for $420.00 for the petition fee. Applicants believe no other fee presently is due. However, if Applicants' belief is mistaken, the Commissioner is authorized to debit Deposit Account No. 11-0855 for any additional fee due as a consequence of Applicants' submission of this paper.

## Conclusion

Applicants request that the Examiner allow claims 1-15 and that a patent containing these claims issue in due course.

Respectfully submitted,

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